

"Glimpses of Australian Bird-life" is a praiseworthy attempt to encourage the study of the avifauna of the island-continent among field naturalists. The photographs, although on a small scale, are for the most part excellent, while Mr. Robert Hall's brief explanatory notes are (as might be expected) very much to the point. One of the most interesting species depicted is the whip-bird (or coachwhip-bird), while from the point of view of excellence in technique, special mention may be made of the portrait of the so-called reed-warbler and its nest. R. L.

NOTES ON RECENT PETROGRAPHY.

STUDENTS of the processes of sedimentation and of flocculation in clays should not overlook the three papers on sands and sediments, by Messrs. Mellard Reade and Philip Holland, that have been published in the Proceedings of the Liverpool Geological Society. The original analyses of sediments given in the second paper (vol. x., part i., 1905), and in the third now issued (1906), are distinctly valuable. Some of the specific gravities stated for clays seem a little high; but it must be admitted that we possess as yet far too little knowledge of our commonest sedimentary deposits. In vol. x., part ii. (1906), p. 136, the authors point out that "the experiments have, we think, demonstrated the existence of a mass of matter of unsuspected granular minuteness distributed throughout the sedimentary rocks of the earth. . . . We have strong grounds for thinking that the distribution of the finest sediment, in the form of what we may call quartz-dust, is oceanic." The abundance of quartz grains in some rocks popularly classed as argillaceous, such as "slates of coarse texture" (p. 156), is of course already familiar to agricultural investigators.

Mr. H. W. Nichols, in describing new forms of concretions (Field Columbian Museum Publications, Geological Series, vol. iii., No. 3, 1906), usefully brings to the front Forchammer's determinations of magnesia in the skeletons or shells of marine organisms, which were originally published in 1849. Mr. Nichols supports these by analyses of his own (pp. 48-9), *Corallium rubrum* giving him 9.32 per cent. of magnesium carbonate. Forchammer's Mediterranean *Serpula* yielded as high a figure as 7.64 per cent. The *Zoantharia* examined give only from 0.35 per cent. to 0.54 per cent.

Messrs. Allen, Wright, and Clement have experimentally investigated the minerals of the composition MgSiO_3 (*American Journal of Science*, vol. xxii., November, 1906), and have produced artificially the two pyroxenic types, monoclinic and rhombic, and the corresponding two amphibolic types. At atmospheric pressure (p. 415), the monoclinic pyroxene, MgSiO_3 , a rare form in nature, is found to be the product of crystallisation from solvents; the material used for this experiment may be any of the forms of crystalline MgSiO_3 . All the other forms of magnesium silicate (p. 437) pass into the monoclinic pyroxenic form at temperatures between 1150° and 1300° , depending on the crystal-form employed. Enstatite crystallises at lower temperatures than the monoclinic pyroxene. The amphibolic types have been produced by a rapid cooling, which, as the authors point out, is not likely to be the prevailing cause of their occurrence in natural rocks.

Mr. H. I. Jensen, in dealing with the volcanic area of the East Moreton and Wide Bay districts, Queensland (Proc. Linnæan Soc. of New South Wales, 1906, p. 73), describes a number of trachytes containing riebeckite, some of which form important plugs or domes. Trachytes, as well as basalts, are recorded from Gough Island, in the South Atlantic, by Messrs. Pirie and R. Campbell (Proc. Royal Physical Soc. of Edinburgh, vol. xvi., 1906, p. 258). Mr. I. G. Sundell (*Bull. Comm. géol. de Finlande*, No. 16, 1905), writing in English, or American, affirms the importance of cancrinite as "a very abundant and doubtless primary constituent" of the syenites of the parish of Kuolajärvi in N. Finland. His paper, like many others from various parts of the world, shows the strong influence already exerted by the Chicago system of classifying igneous rocks.

Mr. G. K. Gilbert (*Bull. Geol. Soc. America*, vol. xvii., 1906, p. 321) discusses gravitational assemblage in

granite, citing striking cases from the Sierra Nevada, where large crystals of feldspar and hornblende have respectively assembled in aggregates in granite. An example of banded granite, where bands rich in hornblende and mica alternate with others rich in feldspar and quartz, suggests to the author successive sedimentation. Unconformities occur in the banding (p. 324), a dark band always forming the base of the upper series, and truncating obliquely the edges of previous bands. Mr. Gilbert puts forward the view, as a hypothesis, that a pair of bands represents a unit of deposition from the original magma, gravitation playing a rôle in the process.

Mr. R. A. Daly, of Ottawa, whose work in the field of igneous absorption and intermingling is well known, states his case of the Moyie Sill in the Purcell Range with effective lucidity in the *Festschrift zum siebenzigsten Geburtstag von Harry Rosenbusch* (Stuttgart, Schweizerbartsche Verlagsbuchhandlung, 1906). His contribution is entitled "The Differentiation of a Secondary Magma through Gravitational Adjustment," and his argument for the assimilation of a felspathic quartzite-series by a gabbro-magma is supported by a number of chemical analyses. A granite zone intervenes between the gabbro and the overlying part of the quartzite-series, and the author holds that (p. 225) "there is clear chemical proof that the greater proportion of the elements in the granite could have been derived directly by fusion of the quartzite." The gabbro, in its onward passage, absorbed beds of quartzite, but (p. 228) "simultaneously gravitational adjustment has nearly restored the original composition, as the acid, assimilated material rose through the denser gabbro magma to the top of the sill." We need not subscribe as yet to Mr. Daly's view (p. 233 and previous papers) that the pure igneous magma in the earth's crust is of basic composition, since there may be a variety of pure magmas in a variety of localities; yet we believe that there is much soundness in his concluding sentence:—"The fact of 'consanguinity' among the igneous rocks of a petrographical province may be due as much to assimilation as to differentiation." G. A. J. C.

ARCHÆOLOGY IN ITALY.

THE final rejection by the Italian Government of Prof. Waldstein's well-advertised project for an international excavation of Herculaneum gives the Rome correspondent of the *Times* food for reflection with regard to the alleged Chauvinism of Italian archæologists, who will allow no foreigner to take part in Italian excavations, notwithstanding the fact, which they admit freely enough, that Græco-Roman antiquity is the property of the whole world, and not of Italy alone. While admitting that the postponement of the excavation of Herculaneum until such time as Italy can do it by herself does not much matter from the scientific standpoint, since "the treasures which lie beneath Resina are in safe keeping, and might remain undisturbed for centuries," the correspondent remarks that this is by no means the case with regard to other sites, which cry aloud for speedy excavation, for valuable evidence is in their case being destroyed daily by the "march of modern improvement." To do the work, Italy can muster neither sufficient money nor sufficient men, especially the latter. Yet she will not invite foreign aid, which would willingly and gratefully be given by archæological students all over the world. As the *Times* correspondent is obliged regretfully to admit, "The foreigner is at liberty to pay his *lira* for admission to museums and other places; he may even give a round sum for the completion of some work in which he is interested, as long as he does not wish to help in carrying it out himself; he may turn his talents to such use as advertising the achievements of Italian archæologists or translating their books into another language; he may show an intelligent and devoted interest, but it must be from a discreet distance. That, at least, seems to be the moral of all the recent relations between Italy and other countries in the archæological questions which have come to the front during the last twenty years or so. One would willingly believe it otherwise; one would gladly put a more literal and liberal interpretation on their professions of confraternity; but how is it possible

to do so unless Italian archaeologists support their words by actual deeds? One simple fact outweighs all their written and spoken utterances. Nowhere in Italy is any foreign enterprise at work, and never has any foreigner been invited to give his time and his talents to what is, in their own admission, a common cause. If Italian archaeologists would pay to other nations the graceful compliment of employing, now and then, their students as assistants; if those derelict excavations on the shore of the Gulf of Taranto—whose need is so pressing and whose secrets are so necessary to history—could be, even temporarily, confided to foreign institutions; then, and not till then, their assurances would carry weight."

PROGRESSIVE WAVES IN RIVERS.¹

THE stationary waves produced by the interaction of a rapid stream with its bed have been the subject of several investigations. The author finds that by a special mode of vision described in the paper the simultaneous presence of waves progressing down-stream can be readily detected.

In a very shallow stream with a steep channel, the progressive wave becomes the principal and obvious, instead of a subordinate and obscure, feature. In this case the velocity of flow is much reduced by friction. The slightest excess of retardation at any point momentarily increases the depth there, and increase in depth (where the depths are small) increases the velocity, at any rate in the upper layer. Continuous motion is therefore impossible, and is replaced by a gushing flow. If the bed be of nearly uniform cross-section, the gushes take the form of regular transverse progressive waves. If, on the other hand, the cross-section of the channel be very uneven, there may be no lateral coordination, and the intermittence of flow is only detected by the rushing sound and the beating action of the water against an immersed body.

Measurements showed that the total velocity of these roll-waves was equal to the velocity of the current *plus* the velocity of a long wave in water of the observed depth.

All waterfalls tend to break up into conical masses called water-rockets, and in rare cases a fall may be seen which consists of a slow procession of well-separated "rockets" ranged in roughly horizontal lines. A case is described in which this beautiful appearance was due to the formation of roll-waves above the fall.

Roll-waves spontaneously arising in very shallow conduits occur in groups, and the growth of amplitude and wave-length was measured in the case of the conduit of the Grönnbach at Merligen, on the Lake of Thun.

Roll-waves in shallow mountain rivers due to heavy rains in the gathering-ground of the tributary streams are solitary, and, coming without warning before the turbid waters arrive, are dangerous to anglers, who are familiar with the phenomenon on the Tees, Ure, Swale, and other rivers. The uniform cross-section of the Tees near Barnard Castle, and of the Ure near Aysgarth, is peculiarly favourable to their formation and growth.

The cross-stream progressive waves observed by the author in the Whirlpool Rapids of Niagara are a secondary phenomenon arising from the varying amplitude of the familiar stationary waves, a variation which the author traces to its cause. When their interference occurs at the intersecting crest of two stationary waves there ensues one of those great leaps of water which present so splendid an appearance in these rapids. The author invites special attention to the points in which his explanation of these phenomena in Niagara Rapids differs from those hitherto current.

Tidal bores are the only form of progressive wave in rivers which had hitherto received much scientific attention. The author deals with the question of what determines the place of origin of the tidal bore in the River Severn, and what is the cause of its apparently capricious variation in magnitude. Briefly, the bore originates where the slope of the channel is steep, but in the *upper*, not the lower, part of the steep slope, because there is in the

upper part no alternative channel among the sand-banks for the last-of-ebb and first-of-flood respectively to pursue, but at the end of a set of spring tides the flood has so far cut in the sand an alternative, straight channel that the height of the bore is reduced. An excess of land-water, on the contrary, so strengthens the ebb that it tends to make a deep, solitary, curved channel up which the flood must force its way, increasing the height of the bore.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE Western University of Pennsylvania has conferred the honorary degree of LL.D. upon Sir Robert Ball, Sir Robert Cranston, Sir William Turner, Sir William Preece, Mr. Marconi, Dr. Chalmers Mitchell, Dr. John Rhys, the Rev. E. S. Roberts (Master of Caius College, Cambridge), and Mr. Edwin Abbey.

A CONFERENCE on the teaching of hygiene and temperance in the universities and schools of the British Empire will be held at the Examination Hall, Victoria Embankment, on St. George's Day, April 23. The chairman at the morning session will be Lord Strathcona, and at the afternoon session Sir John Gorst.

THE annual exhibition of students' work will be held at the Borough Polytechnic Institute on Saturday, April 20, from 6-9.30 p.m. The workshops, laboratories, drawing offices, girls' trade school, domestic economy rooms, and other departments of the institute will be open for inspection, and practical work will be carried on during the evening.

THE *Times* correspondent at Ottawa reports that the medical building of McGill University, Montreal, was destroyed by fire on April 16. The museum, with its priceless specimens, is ruined, but a portion of the valuable medical library was saved. The loss is placed at 100,000*l.*, of which 70,000*l.* is covered by insurance. The origin of the fire is unknown, but incendiarism is suspected.

THE accommodation provided at University of London, University College, for the schools of engineering and of architecture will be considerably extended before the beginning of the next session in October by the additional space which becomes available through the removal of University College School to Hampstead. The Andrews scholarships are offered for competition in May; one of these scholarships, value 30*l.*, in science and mathematics, is tenable in the school of engineering.

A PARTY of students of zoology from the Birkbeck College spent part of their Easter vacation in Jersey shore-collecting during the prevailing low tides. More than one hundred and fifty species of shore-life were obtained, illustrating nearly all the animal phyla. The success of the visit was in great part due to the advice and guidance of Mr. J. Sinel, formerly director of the Jersey Marine Biological Station. A selection from the species collected formed a very interesting exhibit at the annual exhibition meeting of the Birkbeck Natural History Society, which was held on Saturday evening, April 13.

THE reports from the universities and colleges which participated, during the year ended March 31, 1906, in the annual grant of 100,000*l.* made by Parliament for "university colleges in Great Britain," and from the three colleges in Wales which receive a grant of 4000*l.* each, have now been published (Cd. 3409) by the Board of Education. Much instructive information can be gathered from the income and expenditure accounts provided by the various institutions. With an income of 42,819*l.*, Birmingham University at the end of the year's working had a balance in its favour of 2557*l.* Leeds University, though it started the year with 1568*l.* in hand, after expending 45,744*l.* ended the year with 395*l.* only to the good. With an expenditure of 53,162*l.*, Liverpool had 532*l.* in hand at the end of the year. Manchester, with an income of 59,155*l.*, came to the close of the year with 131*l.* to the good. Sheffield, which in the year under consideration was still a university college, was with an income of nearly 25,000*l.* about 1500*l.* in debt at the end

¹ Abstract of a paper by Dr. Vaughan Cornish in the *Geographical Journal* for January.